Flexion and Abduction Finger Tracking Gloves For VR Applications

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Introduction

Virtual reality hand tracking is still in its early stages for consumer brand VR. The goal of this project was to design gloves that could track the flexion and abduction (splay) of a person's hand while keeping the user's hand open for comfort and full immersion. A cheaper alternative to the expensive full tracking gloves that are being sold in the professional market currently.
With some improvements, this project can be adapted to have haptic feedback, allowing users to actually feel as if they are holding an object in virtual or augmented reality.

Schematics

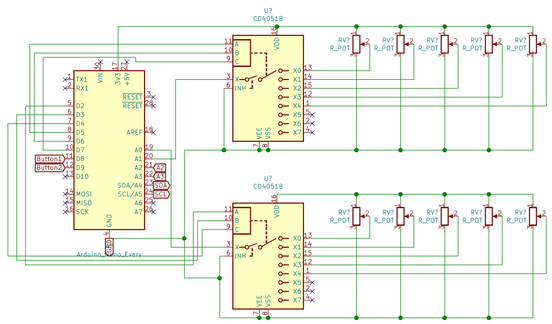

Figure 2 - PCB and Glove Wiring

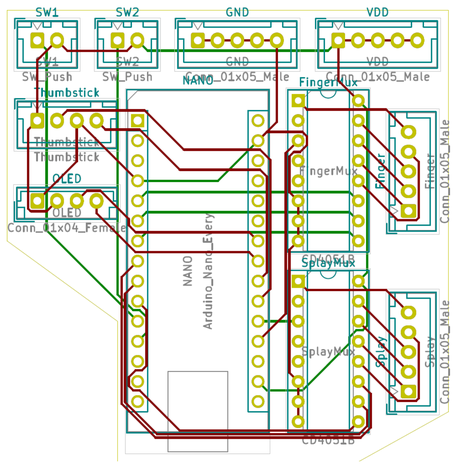

Figure 3 – PCB Footprint and Routing

Figure 3

Objectives

- Passive User Input
- Reliable and Accurate
- sj
- ksm

Challenges

Bluetooth – Finding a method of connecting the microcontroller to the PC to communicate using Bluetooth Low Energy (BLE)

Flat Potentiometer Noise – Presented a wide range of noise that was non-negligible

Haptics – No reliable method of providing haptics was easily integrated into our design with the given time of 8 weeks

Mechanical Movement – On occasion the skeleton arms of the glove would get caught and need a manual reset

Cost Analysis

Item	Qty	Price
Golf Glove	1	
10kΩ Linear Carbon Film Rotary Potentiometer	10	$9.49
26AWG Silicone Insolated Stranded Wire	10ft	$1.50
Custom Printed PCB	1	$16.67
M2x6mm Bolts	20	$1
M2 Lock Nuts	20	$0.50
PETG 3D Filament	200g	$4
CD4051B Analog Multiplexer	2	$0.51
PSP 3000 2-Axis Analog Thumbstick	1	$2.50
Arduino Nano	1	$13.50
Push Button	2	$0.08
	Total:	$66.42

Applications

- VR Gaming
- Motion Capture
- Asset Management
- Augmented Reality
- Kk
- ll
- l
- L
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Firmware

Discuss PCB here ----------

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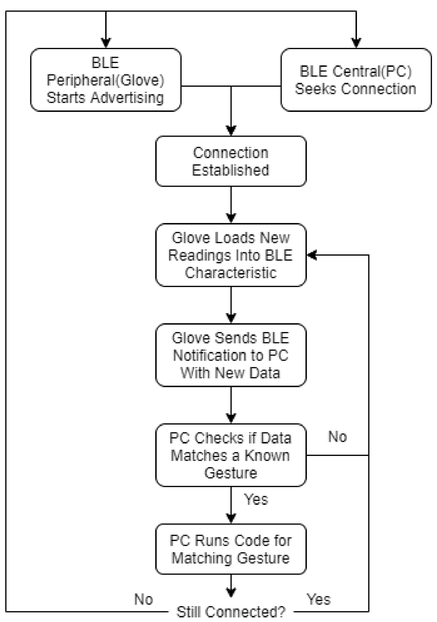
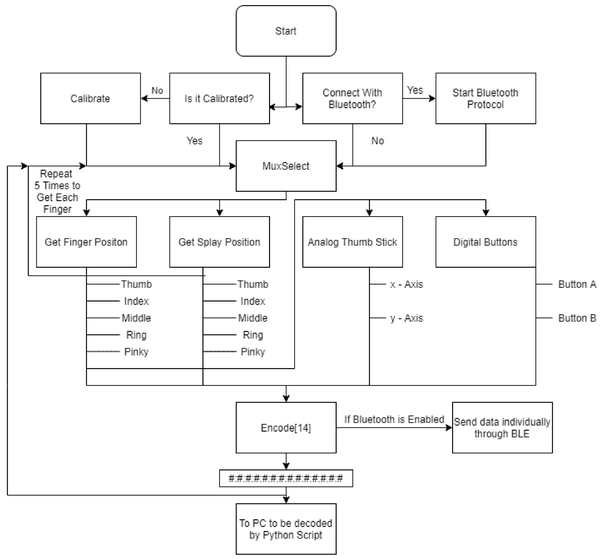
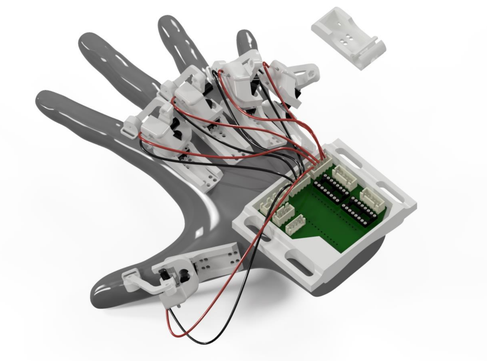
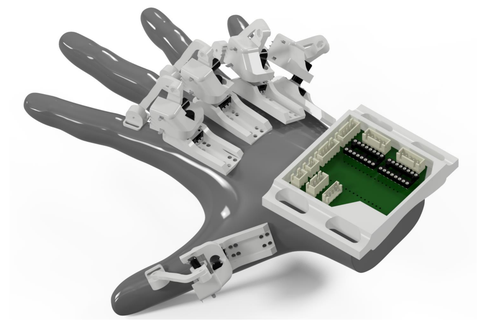




Discuss microcontroller here ----------

Glove Construction





Engineering Standards

JST-XH:
USB:
Bluetooth: IEEE 802.15.1-2002
Haptics: P2861.2 - Standard for Mobile Gaming Systems Integration Framework

References

[1] LucidVR Budget Haptic Gloves
"LucidVR Budget Haptic Gloves: A functional glove that lets you use (and eventually feel) your hands in VR." 17 May 2021, https://hackaday.io/project/178243-lucidvr-budget-haptic-glove
[2] OpenGloves VR Driver
"OpenGloves is an open source, OpenVR driver that allows for use of virtual reality gloves to be used in all SteamVR games that support skeletal input." 17 May 2021, https://store.steampowered.com/app/1574050/OpenGloves/
[3] DexMoGlove